Summary

CHANGES IN THE TOLL SIGNALING PATHWAY IN RESPONSE HONEY BEE *APIS MELLIFERA CARNICA* FOR THE INFESTATION OF *VARROA DESTRUCTOR*

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The present doctoral thesis is based on three published original research articles (1 - Acta Parasitologica 2017, 62(4): 779–789; 2 – Journal of Apicultural Science 2015, 59 (2): 85-93; 3 - Journal of Apicultural Science 2017, DOI 10.1515/JAS-2017-0014), focused on changes in selected elements of immune response of honey bee *Apis mellifera carnica* infested with parasite *Varroa destructor*.

In recent years, the decline of honey bee population has been observed in the world. It is known that the cause of this phenomenon, called colony collapse disorder (CCD), is very complex, but one of the main factors underlying on it is the ectoparasite *Varroa destructor*. This is a parasitic mite feeding on the hemolymph of brood and adult *Apis mellifera*. It represents a unique threat because it is a vector of dangerous pathogens for bees. It is commonly believed that *V. destructor* lowers bee's defense, but many mechanisms related to this suppression are still not fully understood. The dissertation attempts to analyze and compare the effects of natural infestation of *V. destructor* on selected components of the immune system, tested during the development of honey bee brood workers and drones. The changes in the expression of genes important in the insects humoral immune response were tested: i) 14 genes of the Toll pathway, including effector genes of the four antimicrobial peptides (AMPs), ii) expression and activity of phenoloxidase and iii) expression and activity of lysozyme. Research material were five bees' development stages including: cocoonspinning larvae (L5), prepupae (PP), pupae with red eyes (P3), pupae with black eyes and dark-brown body (P5) and freshly hatched imago (I) from colony naturally infested with *V. destructor.*

The results showed that the immune response of brood to infestation changes during its development. The direction and intensity of the changes depends on the stage of development

and sex of the individuals. Activation of the Toll signaling pathway and stimulation of phenoloxidase and lysozyme activity is stronger and begins at the younger stages of development of infested workers (larvae L5 and/or PP) than in drones. As a result, imago workers seem to be less protected than drones. In turn, the weaker stimulation of the Toll transduction pathway, phenoloxidase and lysozyme activities in the early period in males may result in a higher rate of infestation in drones than in workers.

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